Agenda

► Projected Need
► Supply Side Options
► Expansion Plan Analysis
► Next Steps
## Study Methodology

<table>
<thead>
<tr>
<th>Study Methodology</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop 30-year Load Forecast</td>
<td>Ability of existing resources to meet future load demand</td>
</tr>
<tr>
<td>Develop Model</td>
<td>Evaluation of demand side management</td>
</tr>
<tr>
<td></td>
<td>Evaluation of supply side options</td>
</tr>
<tr>
<td></td>
<td>Evaluation of integrated supply and demand side</td>
</tr>
<tr>
<td>Conclusion &amp; Recommendations</td>
<td>Propose a 5- and 30-year plan to meet needs</td>
</tr>
</tbody>
</table>
Current Situation

- 25 MW capacity deficit by 2040 due to LRS retirement
- Significant portion of current resources are "base load"
- Peaking resource is likely "best fit" based on current resources
- Efficient base load resource would be preferred when LRS retires
# Supply Side Options

<table>
<thead>
<tr>
<th>Name</th>
<th>Technology</th>
<th>Nameplate MW</th>
<th>Earliest COD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intermediate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCGT</td>
<td>1x1 GE 7FA Combined Cycle Fully Fired*</td>
<td>403.2</td>
<td>2020</td>
</tr>
<tr>
<td><strong>Peaking</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engines</td>
<td>3xWartsila 20V34SG Engines</td>
<td>27.5</td>
<td>2019</td>
</tr>
<tr>
<td><strong>Renewable</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar</td>
<td>Crystalline Silicon PV Modules</td>
<td>25</td>
<td>2018</td>
</tr>
<tr>
<td>Wind</td>
<td>Vestas V112-3.0 Wind Turbines</td>
<td>25</td>
<td>2020</td>
</tr>
</tbody>
</table>

*Only assuming 27.5 MW stake in a combined cycle*
Fuel Price Forecast

Fuel Price, $/MMBtu

- Natural Gas
- Coal
- LRS Coal
- DFS Coal

Years:
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020
- 2021
- 2022
- 2023
- 2024
- 2025
- 2026
- 2027
- 2028
- 2029
- 2030
- 2031
- 2032
- 2033
- 2034
- 2035
- 2036
- 2037
- 2038
- 2039
- 2040
- 2041
- 2042
- 2043
- 2044
Market Sales Price

Average Market Sales Price

Energy Price $/MWh

- $0.00
- $10.00
- $20.00
- $30.00
- $40.00
- $50.00
- $60.00
- $70.00


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Resource Scenario Development

- Market Capacity Purchases
- Combined Cycle Participation
- Reciprocating Engines
- Reciprocating Engines and Wind PPA
- Reciprocating Engines and Solar PPA
Market Capacity Only

- Dry Fork Station
- Loveland Area Project
- Gas Engines
- Market Capacity
- Laramie River Station
- Salt Lake City Integrated Area Project
- RMRG Reserve Obligation (MW)
- System Peak
Combined Cycle

- Dry Fork Station
- Loveland Area Project
- Gas Engines
- CCGT
- Laramie River Station
- Salt Lake City Integrated Area Project
- RMRG Reserve Obligation (MW)
- System Peak

Graph showing the comparison of different power stations from 2016 to 2045.
Wartsila Gas Engines

- Dry Fork Station
- Laramie River Station
- Loveland Area Project
- Salt Lake City Integrated Area Project
- Gas Engines
- RMRG Reserve Obligation (MW)
- Wartsila
- System Peak

MegaWatts

Year: [2016-2045]
## Scenario Comparison

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Combined Cycle</th>
<th>Market Capacity</th>
<th>Reciprocating Engines</th>
<th>Reciprocating Engines + Wind</th>
<th>Reciprocating Engines + Solar</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Resource COD</td>
<td>2040</td>
<td>N/A</td>
<td>2040</td>
<td>2040</td>
<td>2040</td>
</tr>
<tr>
<td>Capacity (MW)</td>
<td>27.39</td>
<td>N/A</td>
<td>27.5</td>
<td>27.5</td>
<td>27.5</td>
</tr>
<tr>
<td>Renewable Capacity (MW)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Total Scenario Cost</td>
<td>$374,800,000</td>
<td>$378,300,000</td>
<td>$381,300,000</td>
<td>$382,300,000</td>
<td>$387,700,000</td>
</tr>
<tr>
<td>% Different (from low)</td>
<td>0.00%</td>
<td>0.93%</td>
<td>1.73%</td>
<td>2.00%</td>
<td>3.44%</td>
</tr>
</tbody>
</table>

New Resource COD:
Resource Annual Cost Summary

Annual Resource Net Costs (2041)

- Combined Cycle
- Market Capacity
- Reciprocating Engines
- Reciprocating Engines + Wind
- Reciprocating Engines + Solar

Cost of Market Purchases  Revenue from Market Sales  O&M and Fuel Costs  Capital Cost  Net Cost

($35,000,000)  ($30,000,000)  ($25,000,000)  ($20,000,000)  ($15,000,000)  ($10,000,000)  ($5,000,000)  $0

($5,000,000)  ($10,000,000)
Scenario Considerations

► Combined Cycle
  • Limited by availability of projects being developed in the area.
  • Joint ownership may cause operational issues.
  • Lowest cost plan

► Market Capacity
  • Availability of market capacity fluctuates over time, making cost difficult to predict.
  • Integrated market places may effect future market purchases.
Scenario Considerations

► Wartsila Engines
  • Control over project development and operation.
  • Higher cost on a $/kW basis than Combined Cycle.

► Wartsila Engines & Wind
  • Need gas firming for “un-schedulable” wind.
  • Higher wind cost in the future does not beat the market

► Wartsila Engines & Solar
  • Need gas firming for “un-schedulable” solar.
  • Highest cost scenario considered.
Next Steps

► Continuing Public Webinar Series:
  ▪ Part 1 – Study Introduction & Background
    June 21: 11:00 am -12:00 pm Mountain Time
  ▪ Part 2 – Demand Side Management
    June 28: 11:00 am -12:00 pm Mountain Time
  ▪ Part 3 – Supply Side Options
    July 5: 11:00 am -12:00 pm Mountain Time
  ▪ Part 4 – Integrated Analysis
    July 12: 11:00 am -12:00 pm Mountain Time
Questions

Please send questions and comments to: wmpa2016irp@burnsmcd.com

Visit WMPA’s website for more information on the IRP:
www.wmpa.org

Thank you for your time.